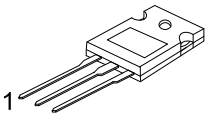
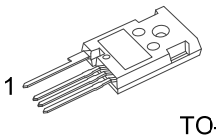
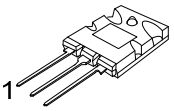
75A, 600V N-CHANNEL SUPER-JUNCTION MOSFET



TO-247



TO-247-4



TO-264

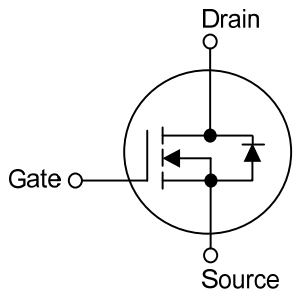
■ DESCRIPTION

The **UTC 75NM60** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

■ FEATURES

* $R_{DS(ON)} \leq 42\ m\Omega$ @ V_{GS}=10V, I_D=37.5A
* Fast switching capability
* Avalanche energy tested
* Improved dv/dt capability, high ruggedness

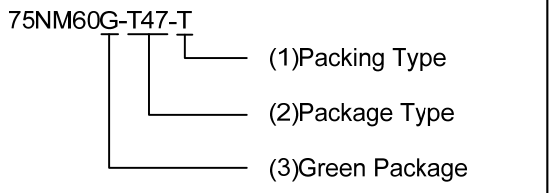
■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment				Packing
Lead Free	Halogen Free		1	2	3	4	
75NM60L-T47-T	75NM60G-T47-T	TO-247	G	D	S	-	Tube
75NM60L-T474-T	75NM60G-T474-T	TO-247-4	D	S	S	G	Tube
75NM60L-T64-T	75NM60G-T64-T	TO-264	G	D	S	-	Tube

Note: Pin Assignment: G: Gate D: Drain S: Source

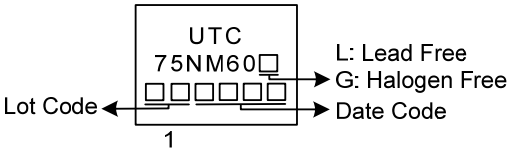


(1) T: Tube

(2) , T47: TO-247, T474: TO-247-4, T64: TO-264

(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_C =25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	600	V
Gate-Source Voltage		V_{GSS}	±30	V
Drain Current	Continuous	I_D	75	A
	Pulsed (Note 2)	I_{DM}	150	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	1188	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	15	V/ns
Power Dissipation	TO-247/TO-247-4	P_D	250	W
	TO-264		255	W
Junction Temperature		T_J	+150	°C
Storage Temperature Range		T_{STG}	-55 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. L = 5mH, I_{AS} = 21.8A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C.
4. I_{SD} ≤ 30A, di/dt ≤ 200A/μs, V_{DD} ≤ $V_{(BR)DSS}$, T_J = 25°C.

■ THERMAL DATA

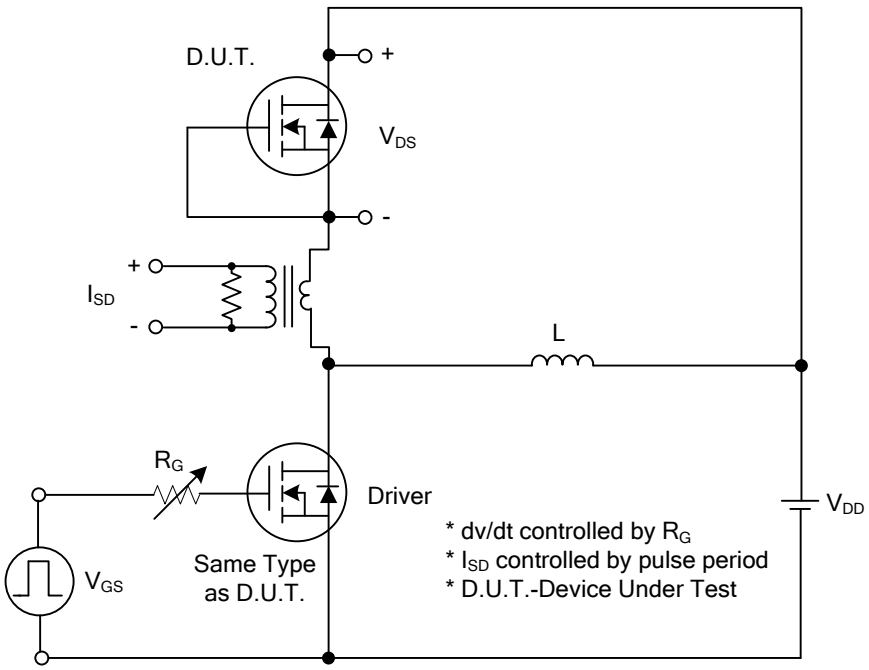
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	40	°C/W
Junction to Case	TO-247/TO-247-4	θ_{JC}	0.5	°C/W
	TO-264		0.4	°C/W

■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

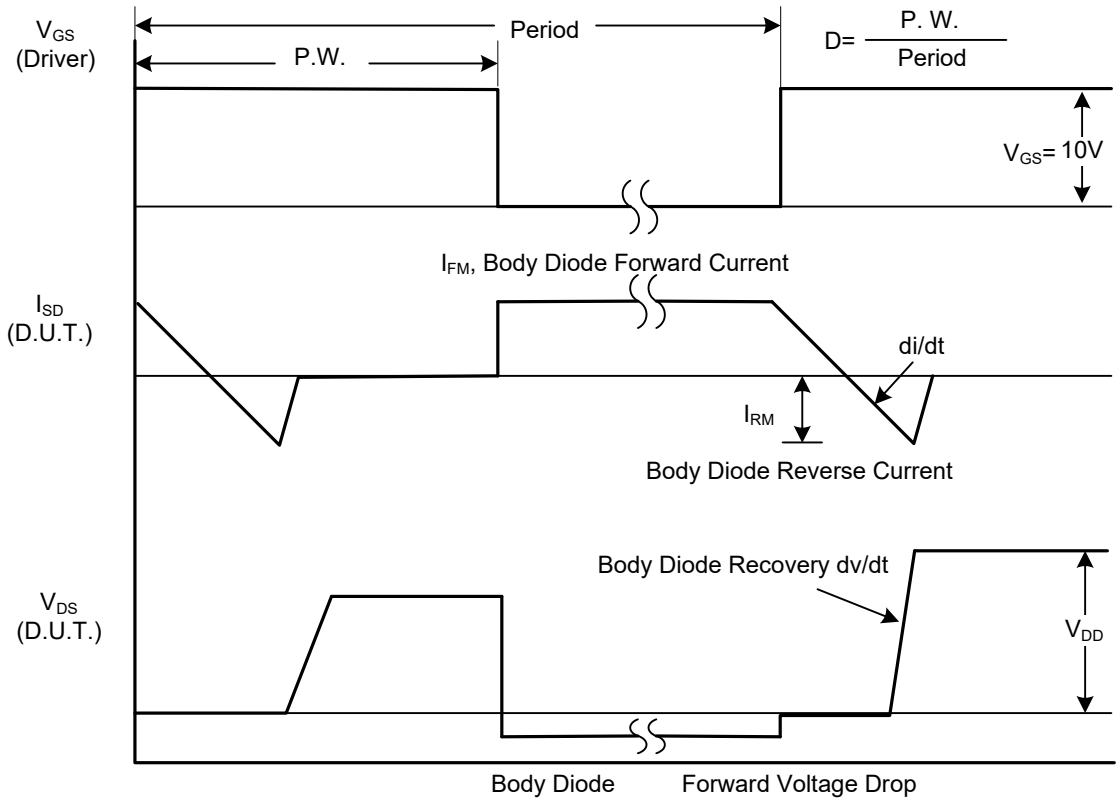
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	600			V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=600V, V_{GS}=0V			10	μA
Gate-Source Leakage Current	I_{GSS}	V_{DS}=0V ,V_{GS}=±30V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS} = V_{GS}, I_D = 250μA	2.5		4.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 37.5A			42	mΩ
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		4500		pF
Output Capacitance	C_{OSS}			2050		pF
Reverse Transfer Capacitance	C_{RSS}			3.7		pF
SWITCHING PARAMETERS						
Total Gate Charge (Note 1)	Q_G	V_{DS}=300V, V_{GS}=10V, I_D=75A , I_G=1mA (Note 1, 2)		210		nC
Gate to Source Charge	Q_{GS}			50		nC
Gate to Drain Charge	Q_{GD}			92		nC
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	V_{DD}=300V, V_{GS}=10V, I_D=30A, R_G=25Ω (Note 1, 2)		96		ns
Rise Time	t_R			60		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			680		ns
Fall-Time	t_F			224		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				75	A
Maximum Body-Diode Pulsed Current	I_{SM}				150	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	I_S =75A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	I_S =30A, V_{GS}=0V, dI_F/dt=100A/μs		720		ns
Body Diode Reverse Recovery Charge	Q_{rr}			17		μC

Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

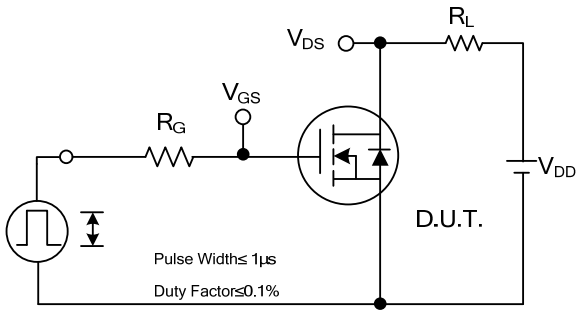


Peak Diode Recovery dv/dt Test Circuit

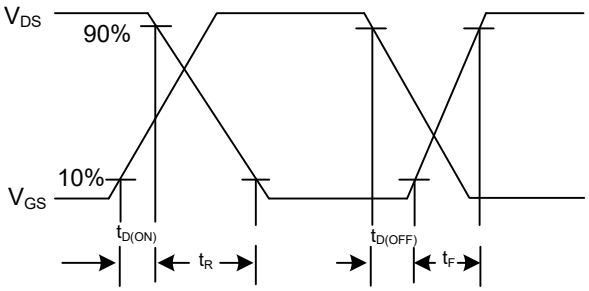


Peak Diode Recovery dv/dt Waveforms

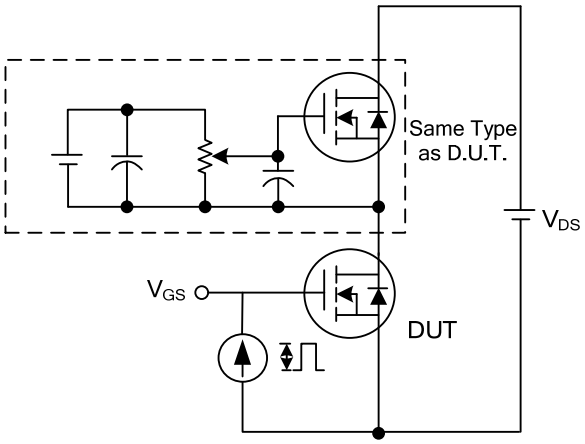
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



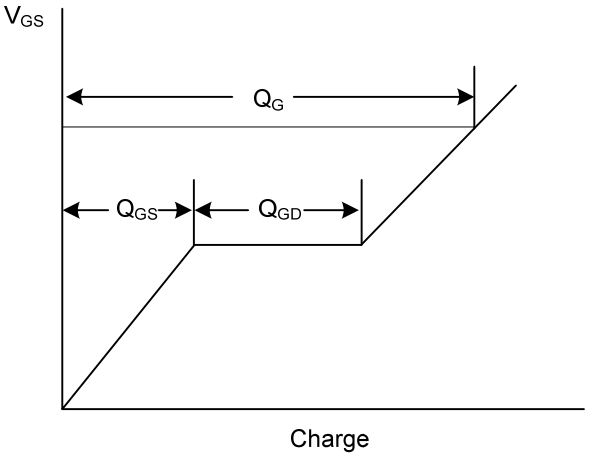
Switching Test Circuit



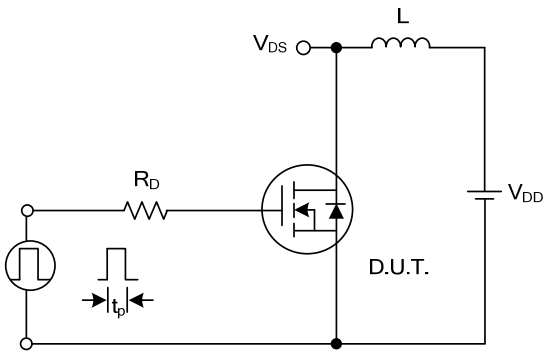
Switching Waveforms



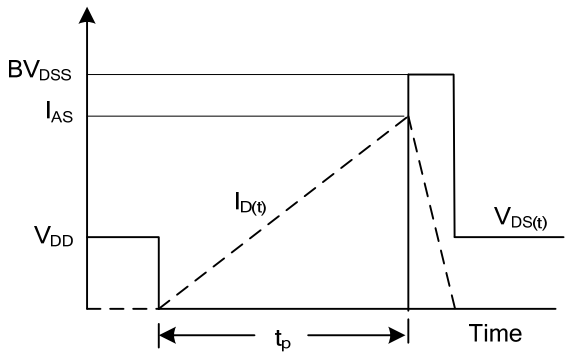
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms